

## Attachment 1

### Review of Speed Limit Policies in Selected Ontario Municipalities – Methodology for Setting Speed Limits on Rural Roads

In the preparation of this proposal, we have undertaken a preliminary review of speed limit policies in place in municipalities in Ontario. We have focused on the policies establishing posted speed limits, particularly on rural roads. These municipalities were chosen based on availability of information, currency of the policy, and the presence of rural roads.

The purpose of this review is to identify the current best practices for setting speed limits on rural roads and recommend a methodology for reviewing speed limits on rural roads in the Town of Niagara on the Lake.

The municipal jurisdictions in Ontario reviewed in preparation of this proposal generally follow a two-step process in setting speed limits, commonly referred to as the Engineering Approach. These steps are:

1. Setting an initial reference speed limit; and
2. Adjusting the reference speed limit for site specific characteristics.

The variation in the approaches studied is related to the methods used to set the reference speed, and criteria used to adjust the speed for site specific characteristics. We will discuss each of these separately to recommend a preferred methodology for the Town of Niagara on the Lake.

#### **Reference Speed**

Setting the reference speed is the first step in most methodologies for setting posted speed limits. The two most common approaches for doing so are use either the road classification, or the 85th percentile speed of the roadway.

The 85th percentile speed refers to the speed at or below which 85 percent of free flowing traffic on the roadway travels. The 85<sup>th</sup> percentile speed is determined through spot speed surveys at specific locations on the road network. Using the 85th percentile relies on the assumption that the majority of road users act in a safe manner. The advantage of this method is that it results in a speed limit that is logical to road users, and as a result is generally accepted and requires less enforcement.

Municipal roads are classified according to the type of service they provide to road users. Classifications are defined by use, physical characteristics and surrounding land uses. These classifications serve a number of purposes including roadways design, maintenance, and management. Classifications define a recommended speed limit or an acceptable range of speed limits based on the design speed of the road.

For this study we recommend using the Town's existing road classification to set the reference speed for the speed limit review. This would provide a logical reference speed that is based on the design speed of the road, and would serve to control data collection costs and the overall cost of the assignment.

### **Speed Limit Adjustment Criteria**

Criteria used to adjust the reference speed for site specific characteristics differ in the various municipal jurisdictions reviewed. However, these criteria generally include the physical characteristics of the roadway, the presence of vulnerable road users, and the surrounding land use. The Transportation Association of Canada's (TAC) Canadian Guidelines for Establishing Posted Speed Limits (2009) set out a comprehensive set of criteria that is widely accepted in Ontario municipalities. In many cases the TAC Guidelines serve as the tool used, or the basis for the methodology used in setting speed limits.

We recommend using the criteria outlined in the TAC Guidelines to adjust the reference speed limit. These criteria include:

- Horizontal curves;
- Vertical curves;
- Lane width;
- Roadside hazards;
- Pedestrian exposure;
- Cyclist Exposure;
- Pavement surface;
- Number of intersections;
- Number of driveways;
- Interchanges; and
- On-street parking.

Recommended speed limits will be set in increments of 10km/h, not lower than 50 km/h, and will not exceed 80km/h.

### **City of Ottawa –Speed Zoning Policy, 2009**

In 2009, a staff report was produced to update the City's thirty year-old policy for establishing speed limits. This policy also addresses speed zoning methodology, residential 40km/h speed limits, establishing a community engagement process for setting speed limits on local residential roads, setting speed limits on gravel roads, streamlining the speed zoning process, implementing school speed zones and empowering the community by creating an engagement approach to setting speed limits.

At the time of this update, best practice for setting speed limits in the City of Ottawa used the Engineering Approach, with the reference speed based on the 85<sup>th</sup> percentile speed of the road. This practice was based on the assumption that the public will generally act in a safe and appropriate manner. Many gravel roads and non-arterial roadways in the rural area of the City of Ottawa were not signed and defaulted to the 80km/h speed limit prescribed in the Highway Traffic Act. Best practice was

that the Public works Department conducted speed studies based on requests from the public, Councilors, or when there are safety-related factors present such as problematic collision statistics.

The report recommends that the updated speed zoning policy continue the current practice for Speed Limits on Rural Roadways Other than Arterials as described above. The approach to setting the appropriate speed limit will maintain the 85<sup>th</sup> percentile reference speed and the full engineering criteria for complex locations, including pavement width, shoulder width, pedestrian activity, community, Ward Councilors, and police input.

The use of the 85<sup>th</sup> percentile reference speed is contingent upon there being a sufficient number of vehicles on the road, typically defined as a minimum of 30 vehicles per direction within a two-hour period. If sufficient traffic volume exists to conduct the survey, it will be conducted as a spot speed survey.

### **Town of East Gwillimbury – Speed Limit Reduction Warrant Policy, 2013**

The Town of East Gwillimbury's Speed Limit Reduction Warrant Policy, as revised in 2013, sets out speed limits that shall generally be adhered to for various road classifications in the Town. The policy outlines the procedure for conducting a Speed Limit Study. The procedure is initiated by written request for speed limit reduction. Staff will then carry out a preliminary study to determine if a speed reduction is technically warranted. If the preliminary review indicates that a speed reduction is technically warranted Staff will prepare a report to Council to amend the Uniform Traffic By-law. If the request requires further investigation staff will carry out a detailed investigation, and if a speed reduction is not warranted staff will notify the party who made the request.

Practice for setting speed limits outlines several criteria including that the speed limits should be set in accordance with the most favourable environmental and traffic conditions and as close to the 85<sup>th</sup> percentile speed, unless other technical criteria warrant further reduction. These criteria for speed reduction include:

- Traffic volume exceeds 2000 and pedestrian volume exceeds 500; and
- Driveways on any one side of the road exceed 13/km.

The policy also includes that speed limits should not exceed the design speed of the roadway, and the Town Engineer may exercise discretion in establishing speed limits.

### **City of Burlington – Speed Limits Policy, 2012**

The City of Burlington's Speed Limits Policy provides guidelines for establishing and reviewing posted speed limits. The policy states that speed limits will be reviewed using the Transportation Association of Canada's (TAC) Speed Limit Guidelines to determine if a change is warranted, and what the appropriate speed for the roadways is. The speed limit will typically fall within a defined range for the road classification, with all rural roads having an upset maximum speed limit of 80km/h. The resulting speed limits can be reduced based on:

- The physical characteristics of the roadway;
- Requirements for heightened safety in sensitive areas;
- If 85<sup>th</sup> percentile speeds are significantly lower than the recommended speed; or
- A higher than normal frequency or severity of collisions attributable to excessive speeds.

The policy also states that the City will undertake annual measurements of operating speeds at selected locations and, based on the comparison of these measurements with speed limits, identify locations with significant variance between the 85<sup>th</sup> percentile speed and the posted speed limit. Significant variance is defined as 10km/h above or below the speed limit. These locations will be subject to review using the methodology described above.

### **Regional Municipality of York – Speed Limit Policy, 2010**

Prior to the year 2010 the York Region’s Speed Limit Policy was focused on mobility and used the 85<sup>th</sup> percentile speed as a main factor in determining the speed limit for roadways, with adjustments made based on road characteristics such as access density and pedestrian activity. The Region’s Speed Limit Policy was updated in 2010 to address inconsistent speeds on Regional roads, increased urbanization in the Region, and an overall goal to increase road safety based on the knowledge that the faster we travel, the greater the frequency and severity of collisions.

The updated Speed Limit Policy for rural areas defines a maximum speed limit of 80km/h, consistent with the Highway Traffic Act. This speed limit is adjusted depending on traffic and roadways conditions as outlined in the Transportation Association of Canada’s guidelines.

### **City of Kingston – Guidelines for Establishing Posted Speed Limits, 2011**

The City of Kingston developed its Guidelines for Establishing Posted Speed Limits to provide a framework to standardize posted speed limits, with the intent to reduce posted speed limits where necessary. The methodology used in these guidelines was developed incorporating the Transportation Association of Canada’s (TAC) Guidelines for Establishing Posted Speed Limits, to be used along with good engineering judgment. A key component of the development of the City of Kingston’s Guidelines was the assessment of speed limits on rural roads. As in all Ontario municipalities, the default speed limit in rural areas with no speed limit posted is 80km/h.

The TAC Guidelines use an automated spreadsheet analysis that considers roadway classification, function and physical characteristics of a roadway. Data is entered into the spreadsheet, which calculates a recommended speed limit for the roadway. This analysis takes into account risk factors including:

- Horizontal curves;
- Vertical curves;
- Lane width;
- Roadside hazards;
- Pedestrian exposure;

- Cyclist Exposure;
- Pavement surface;
- Number of intersections;
- Number of driveways;
- Interchanges;
- On-street parking.

Generally the higher the risk of collision on a roadway, the lower the recommended speed limit. Recommended speed limits are checked against current operating speed rather than being determined by it, using the 85<sup>th</sup> percentile speed.

### **City of Hamilton – Policy for Setting Speed Limits, 2009**

The City of Hamilton's Policy for Setting Speed Limits was developed in 2009 to replace the City's existing speed limit policy with the newly developed Transportation Association of Canada (TAC) Guidelines for Establishing Posted Speed Limits. The TAC Guidelines use an automated spreadsheet analysis that considers roadway classification, function and physical characteristics of a roadway. Data is entered into the spreadsheet, which calculates a recommended speed limit for the roadway. This analysis takes into account risk factors including:

- Horizontal curves;
- Vertical curves;
- Lane width;
- Roadside hazards;
- Pedestrian exposure;
- Cyclist Exposure;
- Pavement surface;
- Number of intersections;
- Number of driveways;
- Interchanges;
- On-street parking.

Generally the higher the risk of collision on a roadway, the lower the recommended speed limit. Recommended speed limits are checked against current operating speed rather than being determined by it, using the 85<sup>th</sup> percentile speed.

This update to the City's policy was partially in response to the City's Agricultural and Rural Affairs Committee's request for staff to report on the feasibility of standardizing speed limits on rural roads to 60km/h unless otherwise posted, rather than 80km/h as defined by the Highway Traffic Act. Staff recommended that speed limits continue to be assessed on an individual basis, following the TAC Guidelines, so that they are based on the physical characteristics of the roadway and surroundings.

## **Forbes, G. , Global Approaches to Setting Speed Limits, 2012**

This paper was prepared for presentation at the 2012 Conference of the Transportation Association of Canada in Fredericton, New Brunswick. It outlines the history of speed limits, which predate the automobile, and discusses the difference and relative merits of statutory speed limits and individual speed zones. The bulk of the article, however, focuses on approaches to setting speed limits globally.

This article organizes approaches for setting speed limits into four categories: engineering, expert systems, optimization, and safe systems. Each of these is discussed further below.

### *Engineering*

Engineering approaches to setting speed limits are the most widely used and involve analysis based on the existing road infrastructure and traffic conditions. This approach varies in its application, but generally involves a two-step process where:

- Step 1 - A base speed limit, or reference speed, is set according to the 85th percentile speed, the design speed for the road, or other criterion. ; and
- Step 2 - The base speed limit is adjusted according to site specific traffic and infrastructure conditions described above.

Engineering approaches are commonly identified in two groups which are consistent in their use of the above noted two-step process but differ in how they establish the reference speed:

### *Operating Speed Methods*

Operating speed methods begin by setting the reference speed using the 85th percentile operating speed – the speed at which 85 percent of traffic travels at or below. The reference speed is then adjusted for site-specific conditions such as horizontal and vertical alignment, type and density of access, pedestrian activity, and cross-section design.

### *Road Risk Method*

Road risk methods begin by setting the reference speed using the functional classification of the road. The reference speed is then adjusted for site-specific conditions.

### *Expert System*

Expert system approaches set speed limits by attempt to replicate the thought process of road safety experts through the use of a computer-based system consisting of a knowledge base and a set of rules for applying this base. These approaches result in a method that is structured and repeatable.

Expert systems approaches are similar in methodology to the Engineering Methods, but use a more detailed and structured set of judgments.

### *Optimization*

Optimization methods for setting speed limits look at the total societal impact of operating speeds and, based on this, attempt to identify the optimum speed limit that yields the minimum cost of travel. This includes vehicle operation costs, crash costs, travel delay costs, and other societal costs. These methods are capable of considering pedestrians and other non-motorized road users, and the overall transportation objectives for the jurisdiction being studied.

These methods are, however, dependent on value judgments and are may result in speed limits that are not consistent with the road design, or rational to the road user.

### *Injury Minimization or Safe System*

These approaches to setting speed limits are based entirely on road safety over all other considerations such as operating cost or other societal objectives. These approaches use physics and crash-test knowledge to set speed limits that minimize the frequency and severity of crashes.

Speed limits established using these methods may not reflect user expectations for travel speeds and may require the implementation of traffic control measures to make the environment more self-explanatory.

### **Summary**

For the purposes of this assignment, we recommend that the Engineering Method be followed, and that road classifications form the basis for setting the reference speed. The reference speed will then be adjusted on the basis of site-specific criteria, in accordance with the TAC guidelines, to arrive at a recommended speed limit.

That said, we have made a contingency provision in our fee estimate for the conduct of ten (10) spot speed studies by our sub-contractor Pyramid Traffic. At the Town's discretion, these studies could be:

- Omitted from the work program entirely;
- Some or all could be conducted at locations of interest to Town staff, either to further inform the limit-setting process, or as supporting information in presenting recommendations; or
- The studies could be used to identify locations likely to require spot enforcement, once revised speed limits are implemented.

Direction from Town staff on this issue will be sought at the Project Initiation meeting.